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An Experiment in Association

Josephine Carter Barney
College of William & Mary - Arts & Sciences

AN EXPERIMENT IN ASSOCIATION

T H E S I S

Submitted to the Graduate School of the College of William and Mary in Virginia in partial fulfillment of the requirements for the Degree of Master of Arts

By

Josephine Carter Barney

Fredericksburg, Virginia

Williamsburg, Virginia

1926

COLLEGE OF WILLIAM AND MARY.

TO THE DEGREE COMMITTEE:

This is to certify that I have examined the attached thesis entitled,

"An Experiment in Association

Submitted by

Miss Josephine C Barney.

As partial requirement for the Master of Arts Degree at the College of William and Mary.

I approve ~~disapprove~~ this thesis with no comments or with the following comments.

Signed R Thiem

Professor of Psychology and Philosophy.

Date

June. 7th, 1926

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Signed, L. M. Fairchild

Asso. Prof. of Psy.

Introduction. A Brief History Of The Association Psychology.

The phrase "association of ideas" was used for the first time by John Locke. In his "Essay Concerning Human Understanding" in the fourth edition, we find a new chapter entitled "Of the Association of Ideas", in which chapter he discusses the connections between experiences.

He says "some of our ideas have a natural correspondence and connection with one another; it is the office and excellency of our reason to trace these and hold them together in that union and correspondence which is founded in their peculiar beings. Besides this, there is another connection of ideas wholly owing to chance or custom. Ideas that in themselves are not at all kin, come to be so united in men's minds that it is very hard to separate them; they always keep in company, and the one no sooner at any time comes into the understanding, but its associate appears with it; and if there are more than two that are thus united, the whole gang, always inseparable, show themselves together."

Thus we are indebted to Locke for a term which gained currency as used to refer to a doctrine in English psychology known as "Associationism". However, Locke's only real contribution in this field is the introduction of the trem "association of ideas". He is not responsible for the founding of the doctrine of association, nor for fixing the historical significance of the name which he coined.

The laws of the association of remembered images according to similarity, contrast and contiguity, were formulated by Aristotle, who gave some indication of association of sensations as well. For some y years these hints remained practically ignored. In more recent times, before Locke, Thomas Hobbes treated this subject, his view point of association as the mode of succession of ideational experiences being the starting point of modern analysis of determining the manner of association,

hich Locke emphasized so little.

It is well to note here that Locke used the term idea in a roader sense than later usages have assigned to it. When Locke speaks f the association of ideas he refers to possible connections betweenall orts of mental content; while from the time of Hume on, this phrase refers o connections between representative data only.

It should be remembered also, that the problem of association s conceived by Locke is an ethical and pedagogical one, not a problem f psychological analysis. Locke never attempts to find the different odes of connection between experiences as Hobbes. He aimed to trace the ise of wrong associations and to suggest remedies for the errors of udgment and action led to by them.

While then, the "Essay Concerning Human Understanding" urnished the name by which the principle became known, and gave some ackground to succeeding writers, yet Locke's association doctrine is not orked out from a standpoint of psychology, the aim of his "Essay" being pistemological and what little psychological analysis as is in it is one to prove that all knowledge is derived empirically.

efinitions Of Association.

Association, as used by the English psychologists in the ighteenth and nineteenth centuries applies to sequences that occur in rains of memory, imagination or thought; the problem was to formulate the rinciples worked in these. Their conclusion was that one experience ollows another through certain definite relationships. One idea recalls nother which resembles, or was contiguous in a former experience.

This view has been considerably broadened since then. ssociation's role in connection with sensation is construed in many ways. he writers of the association school admit the rise of ideas following ensation, according to the same laws of association that hold where the

antecedent is an idea, some will not agree to this, but all agree that one sensation cannot bring up another by association; the rise of sensation depends on something outside of consciousness, or at least apart from the individual experience.

In considering successive associations, the accepted view is that the antecedent may be either a sensation or an idea, while the conquent is always and idea.

There is a considerable difference of opinion concerning simultaneous association: some contend that such complexes of experience are examples of genuine association, while others will not agree to this.

How association operates is also stated variously. Among the laws most emphatically suggested are those of similarity and contiguity.

The factors determining the strength of a certain association havebeen also analyzed variously. Here the principles of habit and intensity are predominant

From Plato to Hume.

Aristotle. The fundamental notion that one idea or memory image follows another according to definite laws was the first pre-requisite toward a general theory of association among mental states. This idea found its first expression in the writings of Aristotle. (385-322 B.C.)

Plato suggests in the "Phaedo" the use of contiguity and similarity in recollecting: "What is the feeling of lovers when they recognize a lyre or a garment or anything else which the beloved has been in the habit of using? Do not they from knowing the lyre form in the minds eye an image of the youth to which the lyre belongs?.....When we perceive something either by the help of sight of hearing, or some other sense, there is no difficulty in receiving from this a conception of some other thing, like or unlike, which had been forgotten, and which had been associated with this."

Nowhere does Plato develop this idea further. Knowledge, for Plato, being innate, we draw out such knowledge just as events in present life are recollected, by similiar experiences, or by unalike but "contiguous" ones.

Aristotle offered three sorts of relationships in the succession of thoughts: similarity, contrast, and contiguity. Aristotle's contentions are as follows: He was the first to point out that the sequence of cognitive experience is not mere chance, but occurs through a definite process of natural associations. He pointed out also, that habit is an important factor in determining association. He specified the principle of similarity, contrast and contiguity, as sole bases of "habitual" association# connection. Furthermore #he declared that the same law applies in purposive thinking as in a spontaneous flow of thought. Post Aristotelian contributions.

Aristotle's views were neither understood nor accepted by the thinkers of the next few centuries. Epicurus held that every notion proceeds from the senses, directly or in consequence of some analogy or proportion or combination. The recollection of an external object after perceived anteriorly occurs this way. "At the same time we utter the word man , we conceive the figure of a man, in virtue of a preconception which we owe to the preceding operations of the senses". Thus sucessive association is implied, but not clearly brought out.

Of the sKeptics, Carneades (215-129 B.C.) certainly refers to successive association. According to Empiricus, Corneades compares the succession of thoughts to "a chain" in which one link is dependent on another.

Saint Agustine (354- 430 A.D.) somewhat indebted to Aristotle lays more emphasis on the factor of contiguity in association.

Louis Vives (492-1540 A.D.) a commentator on Aristotle was at the same time somewhat original, although he makes no attempt to

analyze the laws of association into their first psychological terms as did Aristotle.

Hobbes. Here begins a new epoch in the development of the doctrine. Aristotle's work was mainly that of enumeration and classification. Hobbes' psychology is important as an initial attempt, first, to establish a relation between different sorts of mental states on what we would call today a psychological basis, and second, to trace all mental content ultimately to sense experience, doing away with the old notion of innate ideas. His historical value to associationism lies in the fact that he established the type of psychology which associationism naturally and logically developed.

John Locke. As already noted to John Locke belongs the credit of originating the phrase "association of ideas". Locke distinguishes between two sources of ideas, sensation and reflection, and calls the two classes of experience that arise therefrom "ideas of sensation" and "ideas of reflection".,respectively. According to Locke, the ideas of sensation are transformed into other sorts of ideas, by separate faculty or function, which he calls reflection; and further, there are certain ideas derived from reflection alone.

According to Locke's view, association, whether concerned with the succession of ideas or their composition into complex experiences, is of two sorts; it is based either on a "natural correspondence" or on "chance or custom". His chief historic merit in psychology is his contribution of the term "association of ideas", which focused the attention of future thinkers on this factor as a means for the empirical derivation of knowledge. His emphasis on habit or custom as a factor in association also had a considerable influence on future analysis.

George Berkeley. Berkeley lays considerable stress on the associative process, which he terms "suggestion", and enumerates several of its modes. Berkeley divides our mental content into ideas of sense and ideas of imagination. "The ideas of sense are more strong, lively, and distinct than those of imagination; they have likewise an order and coherence and are not excited at random, but in a regular train or series." The ideas of imagination "are more properly termed ideas or images of things which they copy and represent". The modes of association of successive ideas are, according to him, similarity, causeality, coexistance and contiguity.

David Hume. Hume was the first after Aristotle to attempt a thorough classification of the modes of association. He says, " to me there appear to be only three principles of connection among ideas, namely, resemblance, contiguity in or place, and cause or effect." A significant contribution is Hume's alteration of the meaning of the term "idea" in the direction already suggested by Berkeley. Hume divides experience into"impressions and ideas". Impressions consist of sensations emotions, etc., which enter with much fdrce into consciousness. Ideas are faint images of these.

David Hartley. According to Hartley, the sole basis of association is contiguity; and he limits it to contiguity in time. He broadens the conception of association by including the motor side in his discussion. He holds that muscular movements form associations of the same sort as the association between ideas, so that the recurrence of one tends to re-instate others which formely succeeded it. In Hartley we first find the principle of association stated broadly enough to cover the entire field of human experience and activity.

John Stuart Mill. According to Mill, similarity is the first principle of association. He postulates three other laws; Contiguity, frequency, and a law to the effect that when an association has acquired a character of inseparability , not only does the idea called up by

association become in our consciouness inseparable from the idea which suggested it, but the facts or phenomena answering to these ideas come at last to seem inseparable in existance". "The distinguishing features of Mill's work are, first, his emphatic reinstatement of mental chemistry as an operation attending certain associations,- second, his thorough of belief, and his assertion that it contains an original element,-third, his logical insight into many difficulties of early associationism, and his tentative solutions.

Alexander Bain. Bain distinguishes between three sorts of mental phenomena, first, feeling; second, will; third, cognition, or intellect.

Since this time various other men , such as Brown, George Lewes, Spencer, Murphy and Clifford have made their contributions to associationism. On the continent Condillac, Bonnet, Helvetius, Zannotti, Leibnitz and Beneke, and others have done work in this field.

Association Tests and Mental Diagnosis.

The association of ideas found practical application in abnormal psychology and criminology. Attempts were made to differentiate types of insanity by the types of association which they yield, and the length of association time. It was also sought to determine whether an accused person had knowledge of a crime by the length of association time in significant words and by the kind of associations made with these as compared with the responses to non-significant stimulus words.

The apparent pioneer in this direction is Emil Kraepelin, who in 1833 published a paper on the significance of associations in mental disease. The earliest systematic contribution to diagnostic association tests appear to be an investigation in 1900, by Arthur Wreschner on the associations of a feeble-minded person. In 1901 Frances A. Kellor presented a study showing that the range of ideas in crimnals is much smaller than in normal individuals, illogical connections less frequent.

The diagnostic value of association in cases of mental disorder were examined exhaustively in a series of experiments by C. G. Jung and his associates, Bleuler, and Ricklin. In 1909 A. Wimmer sought to differentiate feeble-minded from normal children on the basis of the type of their associative responses. The Kent- Rosanoff test for differentiating the insane from the normal consisted of a hundred selected stimulus words. The totle results showed an average of 6.8 % individual results for normal personsand 26.8% for the insane. The Kent-Rosanoff test words have been used in many investigations. Prominent among those who have used these are Eastman, Lyman Wells, Mabel V. Loring and Arthur Sutherland.

Every day new uses of the association test are made. It so happened that I was interested in making what I believe to be an initial attempt to discover a possible correllation between the rating given a student on a free association test, (the basis for which rating is later discussed) his score on the Thorndike Intelligence Test, his scholastic average, and the time taken to complete the test.

My colleague, Miss Payne, and I, proceeded with the experiment as follows; a free association test was given twice to one hundred freshmen girls and boys at the College of William and Mary. These were told to write one hundred words first as these came into their minds, omitting sentences etc., and to raise their hands immediately upon completing their lists, receive their time rating, a stop watch being used for this purpose, and to write the same under their names at the top of their papers.

After receiving their papers, Miss Payne and I arranged them by the order of merit method according to the length of time taken to complete the test, the student finishing first coming first in the list etc. Then, <u>before</u> looking up their Intelligence Test scores, Miss Payne and I graded each paper as "A", "B", or "C", according to a standard described later.

After this my colleague and I recorded the Thorndike Intelligence Test score of each student opposite his or her name and finally the scholastic average of each subject for the last semester.

It is perhaps best to explain here what we have taken into consideration in rating each Association Test as "A", "B",or "C", and to illustrate the points considered.

First, one sees in the of Julian Chase (a "C") these various characteristics, all of which are considered indicative of poor association.

1. A predomination of monosyllables.
2. Simple "idea series", such as colors (1-7), animals (17-20),etc.
3. Continuation of initial letter in a series of words (42-46), (47- 50), (39- 42).
4. A series of words relating to the body (73-79), and clothing (79-86).
5. Undue influence of present environment (8-13).
6. The whole word series is impersonal, giving no clues to traits of personality.

On the other hand, we find in the paper of Ross Velardo ("A") the following characteristics;

1. Many indications of interesting traits of personality.
2. A variety of interests indicated by widely differing ideational series.
3. The absence of short monosyllables.
4. An absence of rhyming.
5. No marked influence of the present environment, showing richness of mental imagery.
6. A general absence of other defects noted in papers of "B"

4 min., 3 sec.

Julian Chase.

1. red	26. were	51. won	76. arm
2. white	27. it	52. one	77. finger
3. blue	28. his	53. floor	78. knee
4. black	29. him	54. door	79. ankle
5. green	30. her	55. window	80. shoe
6. orange	31. he	56. seat	81. sock
7. purple	32. she	57. meet	82. tie
8. ink	33. I	58. meat	83. hat
9. pencil	34. we	59. run	84. cap
10. paper	35. they	60. race	85. cape
11. chalk	36. you	61. track	86. cane
12. board	37. thee	62. dash	87. grass
13. book	38. the	63. hurdle	88. tree
14. man	39. a	64. ball	89. dirt
15. woman	40. an	65. sphere	90. dust
16. child	41. or	66. angle	91. ground
17. dog	42. are	67. curve	92. hog
18. cat	43. car	68. erg	93. pig
19. bear	44. cart	69. ion	94. swim
20. horse	45. can	70. dyne	95. ocean
21. cow	46. camp	71. joule	96. water
22. calf	47. farm	72. cheeze	97. suit
23. bull	48. friend	73. head	98. demand
24. saw	49. farmer	74. foot	99. repeat
25. see	50. flew	75. hand	100. first

1. players
2. running
3. kicked
4. short stop
5. throwing
6. hitting
7. baseball
8. football
9. tackle
10. diving
11. swimming
12. jumping
13. vaulting
14. founded
15. gave
16. kiss
17. joined
18. navy
19. vessels
20. gunner
21. first mate
22. flay
23. foreign
24. Phillipino
25. San Domingo
26. marine
27. soldier
28. drowned
29. sinned
30. church
31. mother
32. forgive
33. eating
34. drinking
35. worked
36. follow
37 skirt
38. machine
39. needle
40. trousers
41 pressed
42. ironed
43. floor
44. sweeping
45. broom
46. fighting
47. knockout
48. falling
49. robbed
50. stolen
51forgotten
52 silk
53. pajamas
54. joining
55. forgetting
56. remind
57. forever
58. loving
59. hate
60. sight
61. pretty
62. snowing
63. galoshes
64. houses
65. snapshot
66. posing
67. apple
68. seeding
69. swallow
70. cake
71 package
72. arrest
73. fallen
74. torpedoes
75. sinking
76. away
77 nearby
78. always
79. sheik
80. Sheba
81. jazzing
82. flapper
83. thinking
84. thought
85. forgot
86. remember
87. playful
88. afterward
89. sale
90. fire engine
91. trucks
92. died
93. murder
94. arson
95. bailing
96. judge
97. lawyer
98. courts
99. afterward
100. God

and "C" grade.

All of the "C" papers show these or similar defects, most of them also evidencing a propensity for rhyming.

As it is seen, one basis for grading a paper "A" is a rather negative one, it merely lacks the defects of a "B" or"C", and possesses in addition the virtues listed above.

As for the real objective standard, those papers possessing four or five of the six points considered good, were rated "A", those possessing as many as three or four were rated "B", those possessing only two or less, rated "C".

The classes tested were Miss Powell's class in freshman English, Miss Barney's class in Psychology, Mr. Faithfull's class in Psychology, and Mr. Ball's class in freshman English.

Let us first discuss the results from the first test given Miss Powell's class.

At a moments glance, one can see that there is a very apparent positive correspondence between the ratings given by Miss Payne and me on the association tests and the scores on the Thorndike Intelligence Test.

All students who had been rated "A" on their association test, rate 60 or above on their intelligence test; all "B's" rate from 50 to 60, and all "C's" rate below 50.

It must be kept in mind that the ratings "A", "B", or "C" were made before the Intelligence Test scores of the subjects were looked up, so as to render the judgments unbiased.

Names according to Speed.	Time taken for Association Test	Association Test Ratios	Intelligence Test Ratios	Scholastic Average for Semester
Daughtery, Greyson	3' 69"	C	40	82
Christie, T. H.	4' 40"	C	44	8I
Ford, Frances	4' 50"	A	78	90
Shrives, Margaret	5' 8"	C	45	82
Charnick, Max	5' I8"	B	59	83
Field, Laura	5' 20"	C	42	8I
Chase, Carroll	5' 30"	C	45	82
Dozier, Ruth	5' 50"	C	4I	72
Satterfield, Milloo	5' 50"	C	43	80
		A'S &B'S.		
Coley, Fane	5' 55"	A	64	90
Morris, A. C.	6' 45"	A	69	90
Velado, Ross	6' 45"	A	59	90
Schoner, Irene	6' 48"	B	54	84
Osborne, Helen	6' 52"	B	59	83
Ford, Frances	6' 55"	A	79	95
Sturn, Ruth	7' 3"	A	60	90
Acherman, Elfreeda	8' 35"	A	82	93
Fallin, Eolene	9' 20"	C	32	78
Russell, Lois	II' 35"	B	59	60
Porter, Marion	I2' 48"	C	45	7I

Names according to Speed	Time taken for Association Test	Association Test Ratios	Intelligence Test Ratios	Scholastic Average for Semester
Ford, Frances	2' 30"	A	78	90
Daughtry, Greyson	2' 45"	C	40	82
Coley, Jane	3' 30"	A	64	91
Chase, J, C.	4'3"	C	45	82
Field, Laura	4' 3"	C	42	81
Charnick, Max	4' 3"	B	59	73
Satterfield, Willow	4' 7"	C	43	80
Dozier, Ruth	4' 20"	B	55	72
Shrives, Margaret	4' 30"	B	45	84
Morris, A. C.	4' 35"	A	69	90
Lord, Frances	4' 37"	A	78	95
Stern, Ruth	4' 47"	B	59	89
Schoner, Irene	4' 59"	B	54	84
Acherman, Elfreeda	5'5"	A	82	93
Christie, T. H.	5' 10"	C	44	81
Fallin, Eolene	6' 45"	C	32	78
Porter, Marion	6' 5"	C	45	71
Velardo, Ross	6'7"	A	59	90
Osmond, Helen	6' 7"	C	59	83
Russell, Lois	9' 25"	C	59	60

With regard to the correspondence between rating on association and the scholastic average of the subjects, all who had been rated "A" have an average of 90 or above on their last semester's work, all "B's (with one exception) an average of between 82 and 90, all "C's" an average of below 82.

There appears a positive degree of correspondence, too, between rating on association and the time taken to complete the association test. Those students who completed the test first all rated "C" (with two exceptions) indicating a superficiality of ideas or getting thru" for the accomplishments sake, consequently "naming" those objects nearest at hand etc. Those who finished last , that is, the slowest members of the class, had been rated "C" or "B" also, their retardation being due perhaps to paucity of ideas, or to inhibitions. Practically all of the "A's" and "B's" then, appear toward the middle of the time tabulations, all of these taking from between 5'55" to 8'35", while the first student to complete his test finished in 3'68", and the last in 12'48".

The second tests, again given to Miss Powell's class, are a repetition of the first, and by examinig the results, the same situation, with a few variations, is found.

Without referring to the previous test again, each paper was rated "A", "B", or "C", and then we again attempted to discover a positive correspondence between this rating, the intelligence test score, the scholastic average, and the time taken to complete the test.

It is interesting to note, that although the maximum time taken to write the test was lowered from 12'48" to 9'25", the subjects maintained their same positions, relatively, with a few

Barney I & II

Names according to Speed	Time taken for Association Test	Association Test Ratios	Intelligence Test Ratios	Scholastic Average for Semester
Chaplan, Julius	4' 25"	B	56.4	83
Blake, Rethia	4' 26"	C	20.8	78
Callis, Robert	4' 27"	C	4I	65
Macon, Carlton	5' II "	A	72.6	9I
Borden, M. P.	5' II	A	6I	70
Beatty, Kenneth	5' 48"	B	59	85
Carter, Boyd	6' 33"	B	58	89
Hudson, Logan	6' 49"	A	64	9I
Born, Leonard	8' 22"	A	6I	90
Carter, T. M.	9' 48"	C	5I	70
	Second Test.			
Blake, Rethia	4' 69"	C	20.8	78
Callis, Robert	4' 30"	C	4I	65
Macon, Carlton	4' 52"	A	72.6	9I
Hudson, Logan	4' 712	A	64	9I
Born, Leonard	4' 66"	A	6I	8[illegible]
Beatty, Kenneth	4' 94"	B	59	85
Carter, Boyd	5' 35"	B	58	90
Borden, M. P.	5' 35"	B	6I	70
Carter, T. M.	8' 35"	C	4I	83
Chaplan, Julius	9' 27"	B	56.4	83

exceptions, with regard to the time taken, and that in practically every case, the same association rating had been given.

In general, we find that again those who had been rated "A" on association have a score of 60 or above on the intelligence test, all "B's" rate from 50 to 59, and all "C's" below 50.

Again, too, there is a positive degree of correspondence between the rating on association and the average of last semester's grades. All "A's" averaged as much as 90, all "B's" (with one exception) 82 or above, all "C's" below 82.

While the first subject to complete his test did so in 2'30", a "C", the last one in 9'25", another "C", again those who rated "A" or "B" on their association test fall in the "middle fifty", all ranging in between 4'20" and 5'55".

The results from the two tests given Miss Barney's are approximately the same. All rated "A" on association, have a rating of 60 or above on the Thorndike Intelligence test, the "B's" rate from 50 to 60, and the "C's" below 50.

The last semester's average of those who rated "A" on association, was 90 or above, "B's" 83 to 90, "C's", in this case, below 78.

The first student finished in 4'25", the last in 9'48", all "A's" and "B's" finishing in between 5'11" and 8'2?".

Next, Mr. Faithfull's class. It is interesting to note that Mr. Van Wormer, who had been rated "A", and who has an Intelligence Test score of 98, finished first, illustrating perhaps that a very high order of intelligence is not incompatible with speed in the free association test. In all other respects, however, the results present a face similar to those discussed before.

Faithfull I

Names according to Speed	Time taken for Association Test	Associatio Test Ratios	Intelligence Test Ratios	Scholastic Average for Semester
Van Wormer, D.K.	3' 45"	A	98	95
Carey, Jeff	3' 50"	C	35.8	72
Barnes, Ernest	3' 52"	C	I2	65
Rupp, M. A.	4' 7"	C	25	50
Mapp, George R.	4' I9"	B	59.6	89
Whitney, G. R.	5' 3I"	B	59.4	89
Gessford, GH.	5' 36"	C	30	79
Young, Clyde	5' 35"	C	45.6	78
Hill, Edward	6' 5"	A	60	93
Keys, R. C.	6' I2"	A	6I	92
Temple, M. H.	6' I6"	A	60.I	92
Whitney, Harold	6' 34"	A	6I	93
Hallis, E. B.	7'	A	65	95
Thomson, W.	78' 5"	A	7I	95
Reuger, Lewis	8' I"	B	59	70
Blackwell, N. J.	8' 55"	B	59	89
Gaskins, James	8' 59"	B	59	80
West, W. C.	9" 30"	B	50	83
Blair, Harry	I0' 2"	B	55	83
Vaughan, J. A.	II"	B	59	85
Eshendger, Fred	II' 2"	C	45.2	65

Faithfull II

Names according to Speed	Time taken in Association Test	Association Test Ratios	Intelligence Test Ratios	Average for last Semester (scholastic)
Van Wormer, D. K.	3' 56"	A	98	95
Cary, Jeff	4' 7"	C	35	72
Barnes, Ernest	4' 8"	C	I2	65
Whitney, G. R.	4' 8"	B	59.4	89
Moon, G. R.	4' 24"	B	59.6	89
Rupp, M. A.	4' 47"	C	25	80
Bessford, G. H.	5' 5I"	C	30	79
Young, Clyde	4' 52"	C	45	78
Hill, Edward	4' 63"	A	60	93
Keys, R. C.	4' 72"	A	6I	93
Semple, M. H.	5' 2"	A	60.2	92
Whitney, Harold	5' 8"	A	6I	93
Wallis, E. B.	5' 8"	A	65	95
Thompson, W	5' I5"	A	7I	95
Deuger, Lewis	5' 20"	B	59	76
Haskins, James	6' 9"	B	59	87
Blair, Harry	6' I2"	B	55	83
Askeridge, Fred	7' 45"	C	45.7	65
Vaughan, J. A.	7' 50"	B	59	85
Best, W. C.	8' 20"	B	48.6	83
Blackwell, N. J.	9' 20"	B	59	89

Briefly, those who rated "A" on association, rate 60 or above in intelligence, all "B's" rate from 50 to 60, all "C's", as before below 50.

With regard to their grades, all "A's" in association have as their last semester's average, as much as 92, in this case, all"B's" with two exceptions, 83 or above, all"C's" below 80.

The second subject to finish did so in 3'45", with a "C" rating, the last to do so, in 11'27", with a "C" rating also. All "A's" took from 6'5" to 7'6".

In the second test given to Mr. Faithfull's class, again Mr. Van Wormer finished first. The other results are as follows; all "A's" rate on intelligence 60 or above, the "B's" range from 55.4 (one 48.6) to 59.6, the "C's" from 12 to 45.2. All of the "A's" in this class have a semester's average of 92 or above, all "B's" from 83 to 90, with one exception, and the "C's" from 65 to 72.

The second man to finish took 4'7", rating "C", the last took 9'26", all "A's" finishing in from 4'63" to 5'15".

Mr. Ball's class presented a slightly different problem. Upon examining our first set of papers from this class, it was found that if the point system for grading papers in association was applied, the majority of the papers would be of "C" grade. It was applied, however, as in all of the other cases, and to my surprise these results and the Intelligence test scores presented a positive degree of correspondence just as in our average classes. All but seven in the class had been rated "C" in association, and all but these seven have an intelligence score of from 5 to 39, (exception, a 54). Those who rated "A" on association have an intelligence rating, in this case of 70 or above, "B's" from 53 to 60, with one exception, a 77.

Ball - I

Name according to Speed	Time taken in Association Test	Association Test Ratios	Intelligence Test Ratios	Scholastic Average for last Semester
Ayres, John	4' 9"	C	20	70
Gordon, A. C.	4' I3"	C	5	75
Horton, Outa	4' I9"	C	20	72
Muhany, Elsie	4' 23"	C	I7	70
Sinclair, Carolyn	4' 25"	C	25	73
Rosenbaum, Lilian	4' 30"	C	20	75
Bunting, Leslie	4' 30"	C	3I	70
Hawthorne, K. G.	4' 42"	C	25	65
Clark, Doris	4' 47"	A	77	83
Penn, Sara	5' 24"	B	53	83
Watson, Kathryn	5' 50"	B	57	80
Nelson, Hugh	6' 7"	A	78	83
Newland, H. A.	6' I0"	A	70	93
Ayres, James	6' I9"	B	60	75
Barnes, Blair	6' 22"	B	77	83
Gilbert, Louis	6' 5I"	C	30	75
Beale, J. E.	6' 54"	C	29	75
Duke, Elizabeth	6' 54"	C	39	75
Vaughan, Page	6' 6"	C	33	79
Sendren, C	6' 6"	C	37	79
Watson, Elizabeth	6' 96"	C	26	70
Howard, Georgia	7' 33"	C	24	65

Ball- II

Name according to Speed	Time taken in Association Test	Association Test Ratios	Intelligence Test Ratios	Scholastic Average For last Semester
Hawthorne	3' 22"	C	25	65
Ayres, J. G.	3' 40"	C	20	70
Sinclair, Carolyn	3' 48"	C	25	73
Muhany, Elsie	3' 53"	C	I7	70
Bunting, Leslie	4' 2"	C	3I	70
Rosenbuam, Lilian	4' 6"	C	20	75
Clark, Doris	4' 6"	A	77	80
Watson, Kathryn	[illegible]' 6"	B	57	86
Penn, Sara	5' 2"	B	53	83
Newland, H. A.	5' 35"	A	70	93
Barnes, Blair	5' 47"	B	77	83
Ayres, James	6' 42"	B	60	75
Nelson, Hugh	6' 5I2	A	78	83
Gilbert, Louis	6' 5"	C	30	75
Duke, Elizabeth	7' 7"	C	39	75
Vaughn, Page	8' 9"	C	33	75
Neale, J. E.	8' I0"	C	29	76
Watkins, Elizabeth	9' 48"	C	26	60
Hendren, C	I0' I"	C	37	79
Howard, Georgia	I0' 52"	C	24	65
Bear, K.	II' I5"	C	20	75
Currence, M. A.	II' 55"	C	54	60

Concerning their averages, all of them are remarkably low in this particular class, being made up entirely of Freshmen who are repeating their English course. Only one "A" has a score of as much as 90(a 93), the "B's" all have an average of 80 or above, with one exception, while the remainder of the class, who had been rated "C" on the association test, average from 60 to 70 on their last semester's work.

As for the time taken to complete the test, the "C's", as usual, fell into the first and last part of the curve. The first student finished in 4'9", the last in 8'30", both "C's", while s all of the "A's" and "B's" finished in from 4'47" to 6'2".

Our last set of tests, given again to Mr. Ball's class, all "A's" rated 70 or above on their intelligence score, all "B's", with one exception, from 53 to 60, all "C's" below 39, with one exception, a 60.

In grades, the "A's" average 80, 83, and 93, the "B's" 80, 83, 93, the "C's", from 60 to 79.

In the length of time taken for the test, the results are as before. The first subject to finish did so in 3'22", the last in 11'55", both of "C" rating, while the "A's" and "B's" fall in between 4'6" and 6'51"

Conclusions.

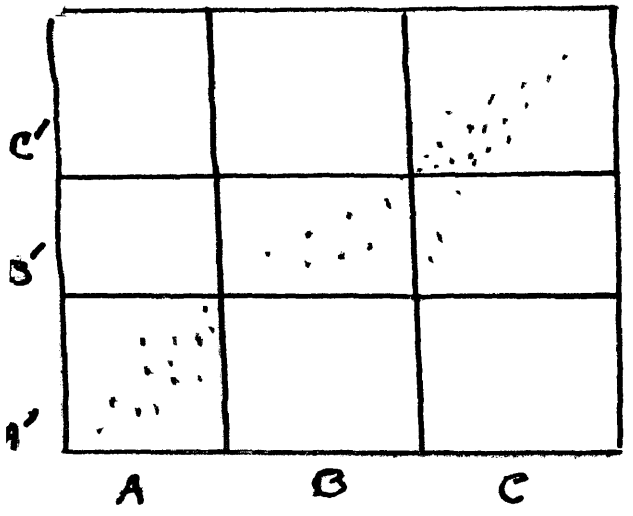
In general, it has been indicated by this experiment that there is a fairly high degree of correspondence between the rating on association, the basis for which rating has been discussed, the Intelligence Test score, the scholastic average of an individual, and the time taken to write the test.

There are perhaps a dozen exceptions in the two hundred

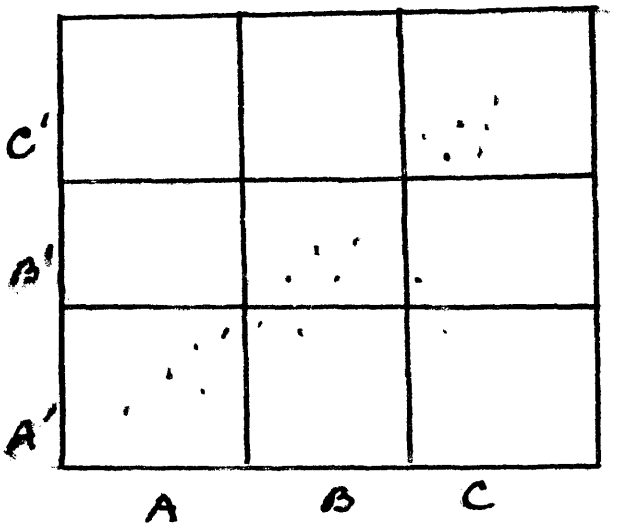
A
B = GRADES.
C

A'
B' = ASSOCIATION.
C'

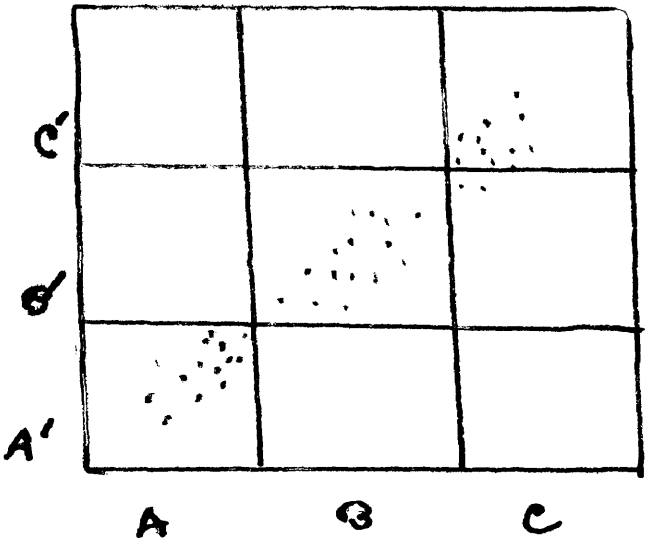
I



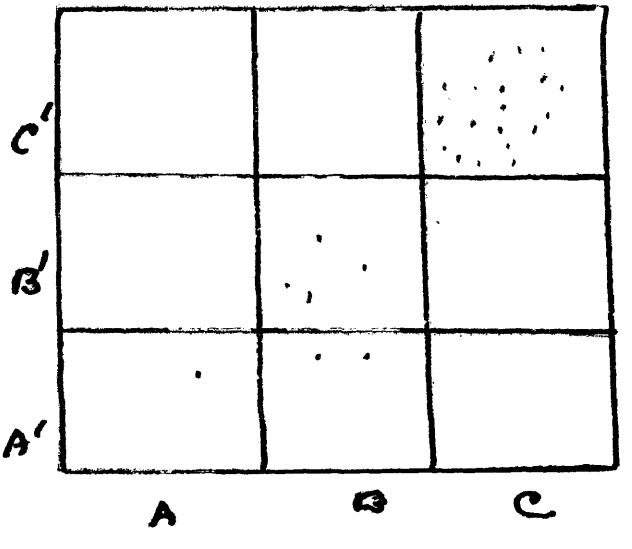
II



III



IV



I = POWELL.
II = BARNEY.
III = FAITHFULL.
IV = BALL.

association tests, but in the remainder of cases the results are uniform and lead to these conclusions.

1. As to the correspondence between the association test rating and the Intelligence Test score.

Those who had been rated "A" on association, have ann intelligence test score of 60 or above. Those who rated "B" have an intelligence score of from 50 to 60. Those rating "C" a score of below 50 on the intelligence test.

11. The correspondence of the results of the association tests and the scholastic averages.

With a few exceptions, there is also a positive degree of correspondence here. Those who had been rated "A", have an average, for the last semester, of 90 or above (the exceptions for the most part being Mr. Ball's class, which presents a special problem as being a class of repeaters), the "B's" average from 82 to 90, the "C's" below 82.

111. The correspondence between rating on association and time taken to complete the test.

Those who rated "A"or "B" on association fall into the "middle fifty" in the curve of distribution of the length of time taken for the association test. Those who rated "C" fall either at the beginning of the curve, or at the end, in the former case explained as due to anxiety for a "good showing", indicating a lack of the problem solving attitude, or superficiality of ideas, in the latter case due to inhibitions or derth of ideas.

It is seen then, that if the full implications of these

results are considered, that there is apparently a positive degree of correspondence between the association test rating and the Intelligence Test score of the subjects, that it would be both advisable and profitable to give an association test on the order of the one given in this experiment, in connection with, or in addition to, a general intelligence test to aid in giving a clue to the general intelligence, the probable potential scholastic average etc, all of which is possible as evidenced here.

Although this is not within the scope of my experiment, there is another possibility in the use of these association tests not hitherto mentioned. They reflect, I have found in my analysis in this experiment, a great many of the interests of the individuals who take them, and possibly this fact could render them serviceable to those interested in the vocational interests and guidance of students. This is a mere suggestion on my part, having laid no emphasis on this postulation in my experiment, but it serves to show the great possibilities of the use of the principles of association in many and varied fields.

Bibliography.

Jung, C.C. Studies in Word Association
Warren , History of Association Psychology.
Hoffding, Outlines of Psychology, Macmillan Co. 1896.
Prince, The Unconscious , Macmillan Co.
Kulpé, Outlines of Psychology, Macmillan Co. 1893.
James, Psychology, Henry Holt Co. 1892.
Ladd, Elements of Psychology, Chas. Scribners Sons. 1911.
Freud and Brill, Psychopathology, Macmillan Co.
Seashore, Introduction to Psychology, Macmillan Co. 1923.
Kantor, Principles of Psychology, Alfred A. Knopf, 1924.
Judd, Psychology, Ginn and Co. 1917.
Munsterberg, Psychology and Life, Houghton Mifflin , 1899.
Ladd, Outlines of Descriptive Psychology, Scribner, 1898.